INEEL/EXT-01-01529
Revision 2

Field Sampling Plan for Groundwater Monitoring Under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004

T. J. Haney
July 2002

Idaho National Engineering and Environmental Laboratory
Bechtel BWXT Idaho, LLC

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Environmental Restoration Program
Idaho Falls, Idaho 83415

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Approved by

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ABSTRACT

The purpose of this document is to direct the field sampling team in sampling efforts to support the OU 10-08 remedial investigation and to describe the number, type, and location of samples and the types of analyses. Information from this investigation will expand the baseline of groundwater information that will be used to develop a plan for future sitewide groundwater monitoring.

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ACRONYMS

AEC	Atomic Energy Commission
ARDC	Administrative Record and Document Control
ASTM	American Society for Testing Materials
BBWI	Bechtel BWXT Idaho LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CO	Consent Order
COC	chain of custody
COPC	contaminant of potential concern
cpm	counts per minute
DAR	Document Action Request
D&D&D	deactivation, decontamination, and decommissioning
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	Department of Transportation
DQO	data quality objective
EPA	Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facility Agreement
FFA/CO	Federal Facility Agreement/Consent Order
FSP	Field Sampling Plan
FTL	field team leader
GC	gas chromatograph
GFP	gas flow proportional counting
gpm	gallons per minute
HASP	Health and Safety Plan
HCl	hydrochloric
HDPE	high-density polyethylene
HRS	Hazard Ranking System
ID	identification
IDEQ	Idaho Department of Environmental Quality
IDW	investigation-derived waste

IH	industrial hygienist
INEEL	Idaho National Engineering and Environmental Laboratory
LSC	liquid scintillation counting
MCL	maximum contaminant level
MCP	management control procedure
MS	matrix spike
MSD	matrix spike duplicate
NCP	National Contingency Plan
NPL	National Priorities List
O&MM	Operating and Maintenance Manual
ORP	oxidation reduction potential
OU	operable unit
PE	performance evaluation
PM	project manager
PPE	personal protective equipment
PQL	practical quantitation limit/level
QA	quality assurance
QAPjP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RCT	radiological control technician
RDX	cyclotrimethylene trinitroamine
RI/FS	remedial investigation/feasibility study
RML	Radiation Measurements Laboratory
ROD	Record of Decision
RWP	radiological work permit
SAP	Sampling and Analysis Plan
SDA	Subsurface Disposal Area
SDG	Sample Delivery Group
SMO	Sample Management Office
SOP	standard operating procedure
SOW	Statement of Work
TBP	tributyl phosphate
TNT	trinitrotoluene
TPR	technical procedure

TRU	transuranic
TSA	Transuranic Storage Area
USGS	United States Geological Survey
VOA	volatile-organic analysis
VOC	volatile organic compound
WAG	waste area group
WERF	Waste Experimental Reduction Facility
WDDF	Waste Determination and Disposition Form
WGS	Waste Generator Services

Field Sampling Plan for Groundwater Monitoring under Operable Unit 10-08 for Fiscal Years 2002, 2003, and 2004

1. INTRODUCTION

1.1 Scope

The work described in this Field Sampling Plan (FSP) supports the Operable Unit (OU) 10-08 Waste Area Group (WAG) 10 remedial investigation/feasibility study (RI/FS) investigation under the Federal Facilities Agreement and Consent Order (FFA/CO) at the Idaho National Engineering and Environmental Laboratory (INEEL). The goals of the project are discussed in the RI/FS Work Plan (DOE-ID 2001b).

The Sampling and Analysis Plan (SAP) consists of two parts: this FSP and the *Quality Assurance Project Plan (QAPjP) for WAGs 1, 2, 3, 4, 5, 6, 7, and 10* (DOE-ID 2001). This FSP has been prepared in accordance with INEEL Environmental Restoration (ER) management control procedures (MCPs) and guidance from the U.S. Environmental Protection Agency (EPA) document, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988). This FSP describes the field activities that will occur and the QAPjP describes the processes and programs that ensure the data generated will be suitable for its intended use.

The purpose of this FSP is to guide the field team in the collection of groundwater samples on a regular, defined schedule from a limited number of boundary, guard, and baseline wells in fiscal years 2002, 2003, and 2004. The objectives of this investigation are discussed in detail in the WAG 10, OU-10-08 RI/FS Work Plan (DOE-ID 2002).

1.2 Idaho National Engineering and Environmental Laboratory Background

Located 42 mi west of Idaho Falls, Idaho, the INEEL occupies 890 mi^2 of the northwestern portion of the Eastern Snake River Plain (Figure 1-1). Comprehensive INEEL historical and geological information relevant to the INEEL is provided in the WAG 10, OU 10-08 RI/FS Work Plan (DOE-ID 2002).

1.3 Existing Data

The United States Geological Survey (USGS) has performed numerous environmental studies and investigations in and around the INEEL. Data from USGS wells and from USGS samples collected at OU 10-08 wells will be used along with the data generated during ER groundwater sampling activities. Additional discussion is available in the OU 10-08 RI/FS Work Plan (DOE-ID 2002).

1.3.1 Identification of Data Gaps

The USGS and others have studied the hydrogeology of the INEEL for over 40 years. Groundwater studies specific to various facilities have been conducted since 1971. The OU 10-08 RI/FS Work Plan (DOE-ID 2002) provides a discussion of known and suspected contaminant sources and the plan to identify data gaps pertaining to groundwater.

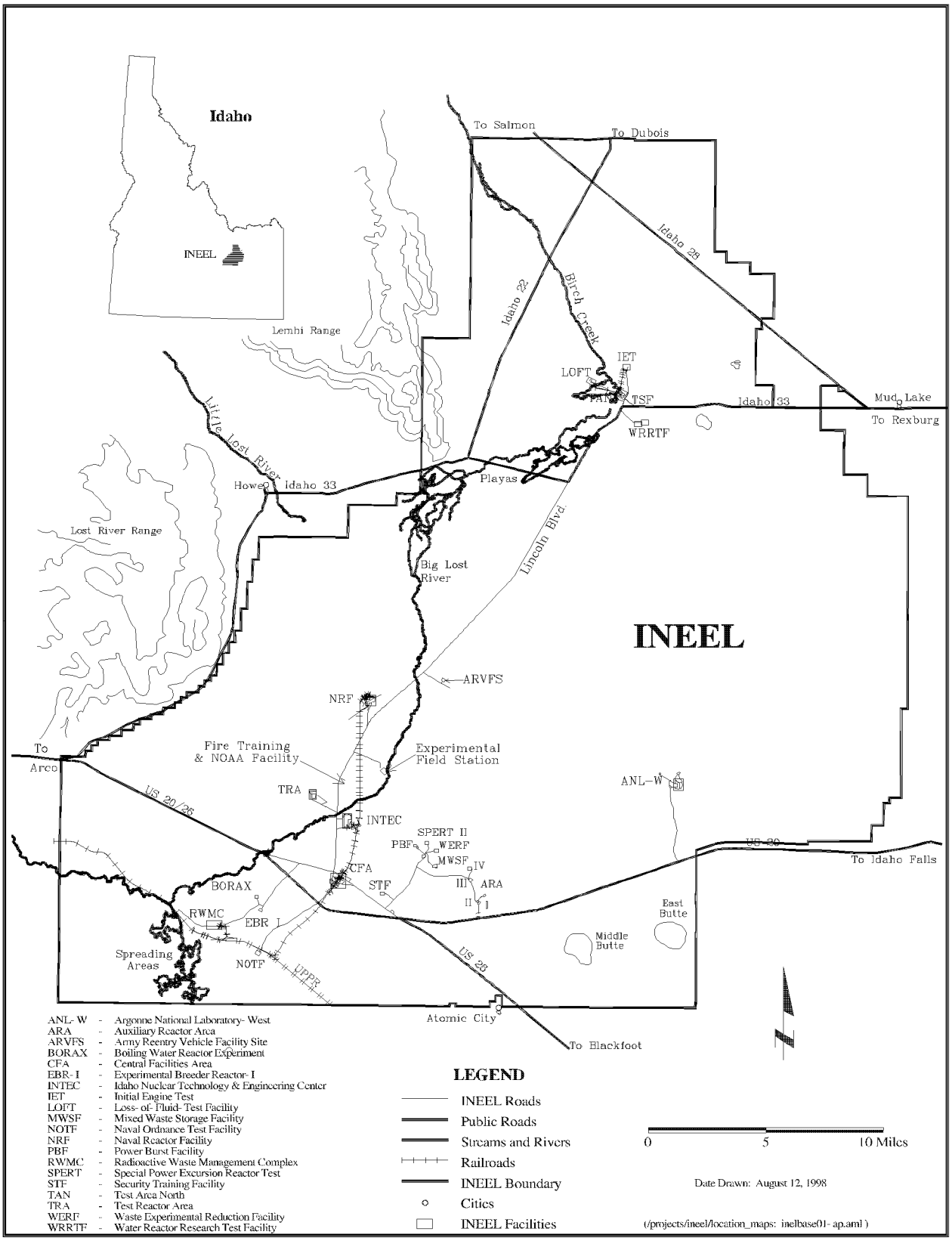

Figure 1-1. Map of the INEEL Site showing the locations of major facilities.

2. DATA USES

2.1 Data Quality Objectives

The data quality objectives (DQOs) for the OU 10-08 groundwater sampling are contained in the RI/FS Work Plan (DOE-ID 2002).

During the DQO scooping process, the original directions and assumptions identified for OU 10-08 in the OU 10-04 Work Plan (DOE-ID 1999) are still considered valid. These directions and assumptions are:

- Historical groundwater data would be consolidated and reviewed to eliminate the need for collecting new data to the extent practicable.
- The groundwater data previously obtained for other site activities are of sufficient quality to support the OU 10-08 RI/FS decision process.

2.2 Action Levels

The analytes and action levels for the guard, baseline, and boundary wells are listed in Table 2-1. The sampling and analysis plan (SAP) tables, included as Appendix B of this document, show the wells to be sampled and the laboratory analyses for each sample.

Table 2-1. OU 10-08 analytes and required quantitation levels.

Contaminant Type	Contaminant Name	Action Level and/or MCLs[c]	PQL Required (At least 1/2 MCL)	Analytical Method
Organics:	Carbon Tetrachloride	0.005 mg/L	0.001 mg/L[d]	All via USEPA
(Volatile organic compounds)	cis-1,2-Dichloroethene (cis-1,2-DCE)	0.07 mg/L	0.01 mg/L[d]	
	Methylene Chloride (Dichloromethane)	0.005 mg/L	0.001 mg/L[d]	Method 8260-B
	Tetrachloroethylene (PCE)	0.005 mg/L	0.001 mg/L[d]	
	Trans-1,2-Dichloroethene (trans-1,2-DCE)	0.1 mg/L	0.001 mg/L[d]	Appendix IX Group
	Trichloroethene (TCE)	0.005 mg/L	0.001 mg/L[d]	
Inorganics: (Metals)	Arsenic (As)	0.05 mg/L	0.01 mg/L	e
	Beryllium (Be)	0.004 mg/L	0.0008 mg/L	e
	Cadmium (Cd)	0.005 mg/L	0.001mg/L	e
	Chromium (Cr)	0.1 mg/L (total)	0.01 mg/L	e
	Lead (Pb)	Action Level = 0.015 mg/L	0.003 mg/L	e
	Mercury (Hg)	0.002 mg/L	0.0002 mg/L	e
	Zinc	5 mg/L (SDWS[5])	0.020 mg/L	e
Other:	Nitrate (as Nitrogen)	10 mg/L	2 mg/L	f
	TNT[a]	0.1 mg/L[i]	0.05 mg/L	USEPA Method 8330
	RDX[b]	0.03 mg/L[i]	0.015 mg/L	USEPA Method 8330
Radionuclides:	Gross Alpha	15 pCi/L - Total	4 pCi/L	GFP[g]
	Gross Beta (manmade)	Not to exceed 4 mrem/yr to the whole body or any organ	25 pCi/L (1/2 the screening level of 50)	GFP
	Gamma emitters (Cs-137)	200 pCi/L - Total	100 pCi/L	Gamma Spec.
	Uranium (U)	0.030 mg/L - Total	—	USEPA Method 908.0, 908.1

Table 2-1. (continued)

Contaminant Type	Contaminant Name	Action Level and/or MCLs[c]	PQL Required (At least 1/2 MCL)	Analytical Method
Radionuclides: (continued)	Iodine-129 (I-129)	1 pCi/L	0.1 pCi/L	LSC[h]
	Strontium-90 (Sr-90)	8 pCi/L	1 pCi/L	GFP
	Carbon-14 (C-14)	2,000 pCi/L	1,000 pCi/L	LSC
	Technetium-99 (Tc-99)	900 pCi/L	10 pCi/L	GFP; LSC
	Tritium (H-3)	20,000 pCi/L	400 pCi/L	LSC

a. TNT = trinitrotoluene

b. RDX = royal demolition explosive

c. MCL = Maximum contaminant level.

d. Practical quantification limit/level (PQL) based on 25 mL sample volume.

e. Via USEPA Document No. EPA-600/4-79-020 and/or EPA-600/R-04/111 Methods in conjunction with INEEL ER-SOW-156 specifications for Sample Delivery Group (SDG) Type 1C data.

f. Via American Society for Testing and Materials (ASTM) Standard Method D 3867-90 (Method A or B), Standard Method Part 4500- NO3 (Method D, E, F), or USEPA Method 300.0 (Revision 2.1) or 353.2 (Revisions 2.0), in conjunction with INEEL ER-SOW-156 specifications for SDG Type-3 data.

g. GFP = Gas flow proportional counting.

h. LSC = Liquid scintillation counting.

i. Based on "1 in 10,000" Risk-based action levels from the EPA Integrated Risk Information Service.

3. SAMPLING LOCATION, FREQUENCY, AND MEDIA

The general categories of wells identified for sampling under this FSP include:

- Downgradient boundary wells
- Downgradient guard wells
- Upgradient baseline wells

These general categories of wells have been listed in order of sampling priority. The downgradient boundary wells and guard wells are considered the most important to fill data gaps. The priority for filling data gaps reflects the goal of compliance with MCLs and cumulative risk thresholds in the groundwater from INEEL-released contaminants whether on or offsite by 2095. The project will provide the field team with the necessary guidance to ensure the proper wells are sampled. The wells are presented in Table 5-1. The groundwater monitoring wells will be sampled at least annually as presented in the Work Plan (DOE-ID 2002) for the analyses shown in the Appendix B "Sampling and Analysis Plan Tables." Figures A-1 through A-3 in Appendix A show the locations of the monitoring wells to be sampled.

4. SAMPLE IDENTIFICATION

A systematic 10-character sample identification code will be used to uniquely identify all samples. The uniqueness of the number is required for maintaining consistency and ensuring that no two samples are assigned the same identification code. In addition, the sample identification code identifies the WAG conducting the sampling, the sample type, if the sample is a duplicate, and the code's two-letter suffix (analysis code) can be used to identify the requested analysis for each sample. The Sample Management Office (SMO) assigns the sample numbers. The Integrated and Environment Data Management System is used to ensure the uniqueness of sample identification.

5. SAMPLING EQUIPMENT AND PROCEDURES

Sample collection is discussed in Section 5.1. The groundwater monitoring wells, listed in Table 5-1, will be sampled for the analyses shown in the Appendix B SAP table. When possible, sampling will be coordinated with USGS personnel.

5.1 Sample Collection

5.1.1 Site Preparation

All required documentation and safety equipment will be assembled at the well sampling site, including, radios, fire extinguishers, personal protective equipment (PPE), bottles and accessories.

Before sampling, all sampling personnel are responsible for having read both the SAP and the corresponding HASP (INEEL 2002). The field team leader (FTL) will perform a daily site briefing to discuss potential hazards and ensure that all personnel have the required training. The FTL will assign a team member to maintain document control and note this appointment in the WAG 10 groundwater sample logbook per TPR-4910 (Logbook Practices for ER and D&D&D Projects).

All sampling equipment that comes in contact with the sample media will be cleaned following Technical Procedure (TPR)-6541, "Decontaminating Sampling Equipment." The exception to this will be dedicated submersible sampling pumps. Sampling manifolds will be either decontaminated prior to bringing them to the field or decontaminated following use in each well before using them on another well.

5.1.2 Field Measurements

Initially, the field team will establish the work control zone as indicated in the HASP (INEEL 2002), don the appropriate PPE, and measure the depth to water. The water level data are used to determine the volume of water that must be purged before sampling. The field team will measure water levels at each well before purging using either an electronic measuring device or a steel tape measure. In addition, the field team will record the barometric pressure at each well at the time water level depths are determined. A post-sampling water level measurement is not required. In addition to the water level measurement, the field team will also measure the height from the depth-to-water measuring point to the top of the well casing and the stickup of the well casing either above the ground surface or the well pad. Field procedures for measuring water levels in wells are included in TPR-6566, "Measuring Groundwater Levels."

Table 5-1 shows the primary wells that will be sampled. The project will supply the field team with the necessary well completion data, and the field team will calculate the purge volume based on the current water level and will record all calculations on the well purging data form. The project will supply the field team with the approximate past purge volume as a crosscheck.

An inline flow meter may be attached to the sampling apparatus before purging to provide an accurate indicator of the pumping rate. If used, the portable inline flow meter will be attached "downstream" of the sampling port, so decontamination of the flow meter assembly between wells does not occur. The pre-purge flow meter reading will be recorded on the well purging data form so that the total volume purged can be recorded upon sample completion. If an inline flow meter is not used, then the purge water flow volume will be measured using a measured bucket and a watch to measure the approximate flow rate. This will measure the amount of time it takes to fill a specific volume of the bucket (ex: one or five gallons).

Table 5-1. Specific well information.

Well ID	Primary Wells	Screened Interval[a]	Northing[b]	Easting[b]	Depth to Bottom (ft)	Pump Depth (ft)	Approx. Depth to Water
	Boundary Wells						
450	USGS-001	600B630	650509.14	335610.808	635.7	612	588
458	USGS-009	620B650	654491.92	258101.051	654.1	635	607
535	USGS-086	Open	667053.21	243371.419	691	678	649
550	USGS-101	750B865	686264.547	374809.428	865	790	771
552	USGS-103	Open	652206.339	295938.213	760	700	583
554	USGS-105	Open	651355.361	277395.306	800	700	670
557	USGS-108	Open	650807.007	285611.423	760	637	609
558	USGS-109	600B800	651255.188	265735.781	800	656	621
559	USGS-110	580B780	652325.738	321866.503	780	612	566
183	HIGHWAY 2	741B786	687427.66	411631.14	786	no pump	725
	Guard Wells						
184	HIGHWAY 3	680B750	687065.16	277159.41	750	567	538
451	USGS-002	675B696	688843.68	352631.521	704	683	659
553	USGS-104	550B700 Open hole	662584.669	295915.137	560	592	555
555	USGS-106	605B760 Open hole	669059.406	280993.981	760	609	584
556	USGS-107	270B690 Open hole	667130.881	307797.235	690	531	477

Table 5-1. (continued).

Well ID	Primary Wells	Screened Interval[a]	Northing[b]	Easting[b]	Depth to Bottom (ft)	Pump Depth (ft)	Approx. Depth to Water
	Baseline Wells						
453	USGS-004	285B315 Perforated	771126.166	419184.76	553	303	251
		322B553 Open hole					
457	USGS-008	782B812	678015.33	226141.02	812	801	766
468	USGS-019	639B705	756882.924	288826.869	401	322	276
474	USGS-025	285B320	812272.22	347254.46	320	no pump	272
475	USGS-026	232B267	803222.19	369554.53	266.5	255	212
476	USGS-027	250B260 Perforated	782870.402	401830.07	312	262	228
		298B308 Perforated					
147	DH-1B	380 Open	767163.757	320726.773	400	no pump	268
250	P&W-3	322B401	818797.24	350802.53	406	no pump	304

5.1.3 Well Purging

The field team will use TPR-6570, "Sampling Groundwater," and specific well information to calculate purge volumes. Waste management is discussed in Section 9.

During the purging operation, the field team will use the Hydrolab (DataSonde® or MiniSonde®) or an equivalent instrument to measure the purge water for specific conductance, pH, dissolved oxygen, and temperature. If the system allows for measurement of oxidation reduction potential (ORP), then that data will also be collected. The field team will complete a functional check on the Hydrolab (or equivalent instrument) per instructions in the manufacturers manual. If there are extremes in temperature, the FTL may determine that a functional check should be performed more frequently. The factory-provided operating manual will be followed when using the Hydrolab DataSonde, MiniSonde, or equivalent system.

Per TPR-6570, the field team will collect initial readings for specific conductance, pH, dissolved oxygen, temperature, and flow rate just after purging begins and at regular intervals thereafter. All Hydrolab (or equivalent instrument) readings will be recorded on the well purging data form. The flow rate will be recorded in the WAG 10 groundwater sample logbook. There is also space on this form to record readings for total dissolved solids (65% of the conductivity reading). The water parameter readings will provide a check on the stability of the water sampled over time.

Following purging and collection of field measurements in compliance with TPR-6570, groundwater samples will be collected. Table 5-2 outlines the specific requirements for containers, preservation methods, sample volumes, and holding times for these analyses. Special requirements for volatile organics are included in TPR-6570. The samples collected for metals analysis will be filtered during sample collection. The preferred order for water sample collection is covered in TPR-6570.

Table 5-2. Specific groundwater sample requirements for routine monitoring.

Analytical Parameter	Container Size	Container Type	Preservative	Holding Time[a]
Volatile organics (VOA[c]) (SW-846-8260B)	40 mL	3 glass vials w/teflon septa	4°C and H_2SO_4 to pH <2	14 days
2,4,6-trinitrotoluene (TNT)	1 L	Amber glass	Cool 4°C	B
Cyclonite (RDX)	1 L	Amber glass	Cool 4°C	B
Total Metals—filtered CLP list	1 L	G or P[d]	pH <2, HNO_3	6 months, Hg 28 days
Nitrate (as nitrogen)	500 mL	G or P	H_2SO_4 to pH <2	14 days[g]
Tritium (H-3)	125 mL	1 HDPE	None	6 months
Gamma spectroscopy analysis	1 – 2 L	1 – 2 HDPE	pH <2, HNO_3	6 months
Gross alpha/beta; Sr-90; Am-241	3 L	3 HDPE or 1 cubitainer	pH <2, HNO_3	6 months
C-14	1 L	HDPE	None	6 months
Tc-99	1 L	HDPE	HNO_3 to pH <2	6 months
I-129	1 L	Amber glass or HDPE	None	28 days[e] 180 days[f]

a. Holding times are from date of collection as referred to in Federal Register Vol. 49, No. 209, October 26, 1984.

b. Collection to extraction: 7 days. Extraction to analysis: 40 days.

c. VOA = Volatile organic analysis.

d. G or P = Glass or plastic.

e. 28 days in high-density polyethylene (HDPE).

f. 180 days in amber glass.

g. Holding time per "Methods for Chemical Analysis of Water and Wastes," Environmental Protection Agency-600/4-79-020, March, 1983, page xix.

Aqueous organics: need to collect one sample in triplicate volume for each analysis.

6. SAMPLE HANDLING, PACKAGING, AND SHIPPING

After groundwater samples are collected from the well, the gloved sampling technician wipes the bottles to remove residual water and places them in the custody of the designated sample custodian. The sample custodian/shipper is responsible for ensuring that clear tape is placed over bottle labels, lids are checked for tightness, parafilm (excluding VOA samples) is placed around lids, and samples are bagged and properly packaged before shipment. Additional information is found in MCP-244, "Chain of Custody, Sample Handling, and Packaging for CERCLA Activities."

6.1 Field Screening

Groundwater samples have been collected periodically from INEEL wells for several decades. The laboratory results from all of these samples show that the samples are orders of magnitude below the Department of Transportation (DOT) classification of radioactive material. Based on the process knowledge from the previous monitoring results and the fact that all samples are collected from wells outside the facility fences, neither a field sample radiation screen nor a laboratory shipping screen will be required for these groundwater samples.

6.2 Sample Shipping

Samples will be transported in accordance with the regulations issued by the DOT (49 Code of Federal Regulations [CFR] Parts 171 through 178) and EPA sample handling, packaging, and shipping methods (40 CFR 261.C.3C.3). Additional information is found in MCP-244. All samples will be packaged and transported to protect the integrity of the sample and prevent sample leakage.

Upon receipt, laboratory personnel will check the temperature of each batch of coolers per their contract. The laboratory will communicate these temperatures to field personnel, and to the project through SMO, to ensure adequate coolant is used to cool the samples during shipment (if cooling is required). In addition, the laboratory will communicate any other discrepancies, such as broken samples or loss of chain-of-custody, to the project through the SMO. The project will determine the appropriate corrective action case-by-case.

7. DOCUMENTATION

The elements of sample documentation covered in this section are covered in additional detail in the *Quality Assurance Project Plan (QAPjP) for WAGs 1, 2, 3, 4, 5, 6, 7, and 10* (DOE-ID 2001). The FTL or designee is responsible for controlling and maintaining all field documents and records and for ensuring that all required documents are submitted to the Administrative Record and Document Control (ARDC) coordinator.

Field changes requiring document revision will be implemented by the FTL in accordance with the latest revision of MCP-135, "Creating, Modifying, and Canceling Procedures and Other DMCS-Controlled Documents." All entries will be made in permanent, nonsmearable black ink. All errors will be corrected by drawing a single line through the error and entering the correct information. All corrections will be initialed and dated. However, the nature of sampling activities is such that small variations from the FSP are occasionally required to complete the task. These small deviations in the procedures are a one-time event for which a document action request (DAR) is not necessary or desirable. These variations will be recorded in the WAG 10 groundwater sample logbook.

The serial number or identification (ID) number and disposition of all controlled documents (e.g., chain-of-custody [COC] forms) will be recorded in ARDC's document control logbook. If a document is lost, a new document will be completed. The loss of a document and an explanation of how the loss was rectified will be recorded in the document control logbook. The serial number and disposition of all damaged or destroyed field documents will also be recorded. All voided and completed documents will be maintained in a project file until completion of the sampling events, at which time all logbooks, unused tags and labels, COC copies, etc. will be submitted to ER SMO.

The following is a list of necessary field documents:

- COC forms
- WAG 10 Groundwater Sample logbook which will include shipping data, field instrument calibration/standardization logbook, visitor's sign-in, and field team leader notes and comments
- Quality Assurance Project Plan (controlled copy)
- Field Sampling Plan and attachments (controlled copy)
- Health and Safety Plan (controlled copy).

7.1 Field Documentation

7.1.1 Labels

A sample label will be used on each sample. Waterproof, gummed labels will be used. Labels may be affixed to sample containers before going to the field and completed on the actual sample date. The label will contain the sample collection time and date, preservation used, type of analysis, etc. Labels will remain in the custody of the FTL or his designee when not in use.

7.1.2 Chain-of-Custody Forms

The COC record is a multiple-copy form that serves as a written record of sample handling. When a sample changes custody, the person(s) relinquishing and receiving the sample will sign a COC record. Each change of possession will be documented. Thus, a written record tracking sample handling will be established. Additional COC information is found in MCP-244.

7.1.3 Logbooks

The Logbooks applicable to this project will be the WAG 10 Groundwater Sample logbook. TPR-4910, "Logbook Practices for ER and D&D&D Projects," in accordance with ARDC format will be used to record information necessary to interpret the analytical data. All information pertaining to sampling activities will be entered in the logbooks. Entries will be dated and signed by the individual making the entry. All logbooks will be quality control (QC) checked for accuracy and completeness by the FTL or designee.

The field team will use WAG 10 Groundwater Sample logbook as a sample shipping logbook. Each sample will be entered in the logbook. This logbook will be used to record the sample ID number, collection date, shipping date, COC number, cooler number, destination, sample shipping classification, name of shipper, and signature of person performing quality control (QC) check.

Each piece of equipment, as necessary, will have information and a record in the WAG 10 Groundwater Sample logbook on the calibration data. Team members will record information pertaining to the calibration of equipment used during this project.

Daily accounting of information related to this sampling project, including problems encountered, deviations from the SAP, and justification for field decisions will be recorded by the FTL in the WAG 10 Groundwater Sample logbook. This logbook will also double as a visitor's logbook.

The nature of sampling activities is such that variations from the procedures are occasionally required to complete the task. These small deviations in the procedures are a one-time event for which a DAR is not necessary. These variations will be recorded in the WAG 10 Groundwater Sample logbook.

Copies of the logbook pages will be sent to the project at the completion of each round of sampling.

7.1.4 Photographic Records

To verify the well condition, the field team will collect a digital photograph of the well site and well head condition before and after sampling.

7.1.5 Field Guidance Forms

The field team may use field guidance forms to facilitate sample container documentation and organize field activities. Field guide forms contain information on the sample request number, sample ID number, sample location, aliquot number, analysis type, container size and type, and sample preservation.

7.1.6 Waste Management Guidance

For each well, the field team will be provided documentation regarding the approximate purge volume and the required waste management options for the purge volume.

7.2 Project Organization and Responsibility

Specific individuals (as needed) will be assigned the following project positions during performance of the monitoring activities:

- Safety engineer
- Field team leader
- Radiological Control Technician (RCT)
- Industrial hygienist
- Quality engineers
- Facility manager and/or representatives
- SMO point of contact
- Administrative record and document control (ARDC) coordinator
- Radiological engineer
- Occupational Medical Program representative
- Project manager
- Project engineer
- Task lead.

With the exception of the SMO point of contact and the administrative record and document control coordinator, the Health and Safety Plan for the Environmental Restoration Sitewide Groundwater Monitoring (INEEL 2002) should be consulted for the overall organizational structure and specific personnel responsibilities. In addition to responsibility descriptions, the HASP ensures the implementation of occupational health and safety requirements.

8. WASTE MINIMIZATION

As part of the prejob briefing, an emphasis will be placed on waste reduction methods and personnel will be encouraged to continuously attempt to improve methods. No one will use, consume, spend, or expend equipment or materials thoughtlessly or carelessly. Practices to be instituted to support waste minimization include, but are not limited to the following. The project will:

- Restrict materials (especially hazardous material) to those needed for performance of work
- Substitute recyclable or burnable items for disposable items
- Reuse items when practical
- Segregate contaminated from uncontaminated waste
- Segregate reusable items such as PPE and tools.

9. HANDLING AND DISPOSITION OF INVESTIGATION DERIVED WASTE

All waste dispositioning will be coordinated with the appropriate Waste Generator Services (WGS) interface to ensure compliance with applicable waste storage, characterization, treatment, and disposal requirements.

The investigation-derived waste (IDW) produced during sampling will include spent and unused sample material, PPE, miscellaneous sampling supplies, decontamination water, purge water, and samples. The WGS will provide a determination for the disposition of all waste, including purge water, that is based on a waste determination and disposition form (WDDF). In addition to the WGS interface, Appendix G of the OU 10-08 RI/FS Work Plan (DOE-ID 2002) includes instructions for handling investigation-derived waste for this project.

Before sampling, the project will provide the field team with the WGS-generated WDDF for each well that describes the required disposal option for the purge water. Purge water from a majority of wells to be sampled under this FSP is anticipated to be eligible for release to the ground surface. In addition, to help ensure the purge volume is correct, the project will provide the samplers with the approximate volume of water that was purged from the well during a previous sampling round.

If, due to radionuclides, chemicals, or regulatory restrictions, the purged groundwater must be containerized for specific wells, then containerization will be done as long as a disposal option for the containerized purge water is available. If a purge water disposal option is not available, then WAG 10 will make a reasonable effort to find a disposal option before sampling the well and/or to reduce generation of this waste. For example, if the opportunity exists for those sites that have specific purge water disposal restrictions, the groundwater monitoring and sampling team will sample concurrently with other programs or WAGs to eliminate duplication and to provide for the most efficient and compliant management of purge water by those programs.

10. QUALITY

The objective of this investigation is to provide groundwater sample analytical data of sufficient quality and quantity to fill the data gaps identified in DOE-ID 2001b. This FSP is used in conjunction with the QAPjP (DOE-ID 2001). These documents present the functional activities, organization, and quality assurance/quality control (QA/QC) protocols necessary to achieve the specified DQOs. The QAPjP and the FSP together constitute the sampling and analysis plan for OU 10-08. Project-specific quality requirements not addressed in the QAPjP or elsewhere in this document are discussed in this section.

10.1 Quality Control Sampling

As outlined in the QAPjP (DOE-ID 2001), QA objectives are specified so that the data produced are of a known and sufficient quality for determining whether a risk to human health or to the environment exists. Minimum precision, accuracy, and completeness measurements and minimum detection limits are quantitative objectives specified in the QAPjP. Representativeness and comparability are qualitative objectives. During the sampling discussed in this plan field QC samples including field blanks, duplicates, and trip blanks will be collected and analyzed to evaluate the achievement of the precision and accuracy objectives specified in the QAPjP. The frequency of field QC sample collection will meet or exceed the minimum recommended number in the Table 10-1. Overall (field and laboratory) precision will be evaluated through the results of duplicate ground water samples, equipment rinsates, and field blanks. The duplicate samples, equipment rinsates, and field blanks will be analyzed for the same suite of analytes as the regular ground water samples. Trip blanks to be analyzed for volatile organic compounds (VOCs) will be included in each sample cooler shipped to the laboratory that contains VOC sample containers. The QA/QC samples to be collected and the planned analyses are also shown in Appendix B.

10.1.1 Performance Evaluation Samples

Environmental analyses are critical because decision-making based on inaccurate measurements or data of unknown quality can have significant economic and health consequences. To assess the accuracy and precision of the laboratory, performance evaluation (PE) samples will be added, if available, to sample delivery groups of ground water samples. The PE samples are spiked with known concentrations of radionuclides or chemicals in levels similar to those expected in the actual samples. Laboratory accuracy and precision will be evaluated based on their analytical results.

10.2 Quality Assurance Objectives

As outlined in the QAPjP (DOE-ID 2001), QA objectives are specified to ensure that data produced are of a known and sufficient quality. Minimum precision, accuracy, completeness requirements, and minimum detection limits are quantitative QA objectives specified in this plan or in the QAPjP. Representativeness and comparability are qualitative QA objectives.

10.2.1 Precision and Accuracy

The precision of the data will be qualitatively assessed based on the results of duplicate samples. Laboratory precision and accuracy are part of the data validation criteria against which the results are evaluated. In addition, as discussed in Subsection 10.1.1, PE samples will help quantify laboratory accuracy and precision. In general, bias (accuracy) in the field is difficult to assess and in this investigation it will be qualitatively evaluated based on the results of field and equipment blanks.

Table 10-1. Recommended minimum field QC samples.

Sample Type	Purpose	Collection	Documentation
Duplicate	Collocated sample collected to evaluate total measurement precision (cumulative precision error associated with field and laboratory operations)	Duplicates will be collected at a minimum frequency of 1/20 environmental samples or 1 per day, whichever is less.	Assign separate sample number
Field blank	Analyte-free water that is poured into a sample container at the sample collection site to check cross-contamination during sample collection and shipment[c]	**Radionuclides, VOCs, Metals** The recommended minimum frequency is 1/20 environmental samples or 1/day, whichever is less.	Assign separate sample number
Trip blank	Organic-free water in a vial sent from the laboratory to accompany VOC water samples during sampling and shipment processes. This blank is used for checking for cross-contamination during sample handling, shipment, and storage[a]	Trip blanks are for VOCs only. The recommended minimum frequency is 1/VOC cooler. To minimize the number of trip blanks, every effort should be made to include all VOC samples in one cooler and to minimize the number of VOC collection days.	Assign separate sample number

a. The water used for these blanks should be VOC analyte-free and can be obtained from a laboratory familiar with VOC analysis requirements. The SMO can arrange to supply the water if given 2 weeks notice prior to sampling. HPLC-grade water is acceptable for all field blanks except those collected for VOC analysis.

10.2.2 Minimum Detection Limits

The minimum detection limits for this project correspond to MCLs. In all cases, the contract-required quantitation limits and contract-required detection limits will be at least one half the MCL.

10.2.3 Critical Samples

Most of the proposed ground water samples are required to meet the project objectives; therefore, if ground water samples cannot be obtained, a determination will be made on a case-by-case basis as to whether an alternative well will be sampled.

10.2.4 Representativeness

The representativeness of the collected data will be evaluated by confirming whether the sampling methods were adhered to and DQOs were met.

10.2.5 Comparability

Data comparability will be assessed by evaluating the sampling procedures, sample handling, and laboratory analyses for each sample. If consistently applied for all samples, then the data are comparable.

10.2.6 Completeness

Completeness is the measure of the quantity of the usable data that have been collected during an investigation. A goal of 100% is to be achieved for critical samples.

11. DATA VALIDATION, REDUCTION, AND REPORTING

Data validation for the groundwater analytical data will receive Level A validation. Level A data validation is a thorough process done to evaluate subcontractor conformance to both contractual and technical criteria and is documented with a limitations and validation (L&V) report. The L&V report consists of data confirmation and data reduction, data clarification, and data appraisal. Data confirmation is the process of correlating the reported data within a given data package to its corresponding raw data. When applicable, this correlation also includes data reduction. Data reduction is the process of transforming raw data into reported data. This process includes the implementation of all applicable unit conversion calculations and data adjustment from techniques employed to dilute or concentrate samples. Data clarification is the process of qualifying or flagging reported analytical results, based on strict adherence to the applicable validation procedure and/or justifiable professional judgment by the data validator. Data appraisal is the formulation of a comprehensive L&V report that documents the entire method data validation process. The L&V report is written by an analytical chemist or other technical expert performing data validation. The report documents any deficiencies in the data, identified during the method data validation. A separate L&V report is required for each data package that undergoes method data validation. For each sample delivery group, a data limitation and validation report, which includes copies of COC forms, sample results, and validation flags, will be generated. All data limitation and validation reports will be transmitted to the EPA and Idaho Department of Environmental Quality (IDEQ) within 120 days from the last day of sample collection. All definitive data will be uploaded to the ground water sample analysis database.

12. REFERENCES

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49 CFR Part 171, 2000, "General Information, Regulations, and Definitions," *Code of Federal Regulations,* Office of the Federal Register, October 2000.

49 CFR Part 172, 2000, "Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements, *Code of Federal Regulations,* Office of the Federal Register, October 2000.

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49 CFR Part 176, 2000, "Carriage by Vessel," *Code of Federal Regulations,* Office of the Federal Register, October 2000.

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54 FR 29820, 1989, "National Priorities List for Uncontrolled Hazardous Waste Sites," *Federal Register,* United States Environmental Protection Agency, pp. 29820-29825, July 14, 1989.

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MCP-244, "Chain of Custody, Sample Handling, and Packaging for CERCLA Activities," Rev. 4, Environmental Restoration, April 2002.

TPR-4910, "Logbook Practices for ER and D&D&D Projects," May 2002.

TPR-6541, "Decontaminating Sampling Equipment," June 2001.

TPR-6566, "Measuring Groundwater Levels," November 2000.

TPR-6570, "Sampling Groundwater," October 2000.

Appendix A

Figures Showing the Monitoring Well Locations

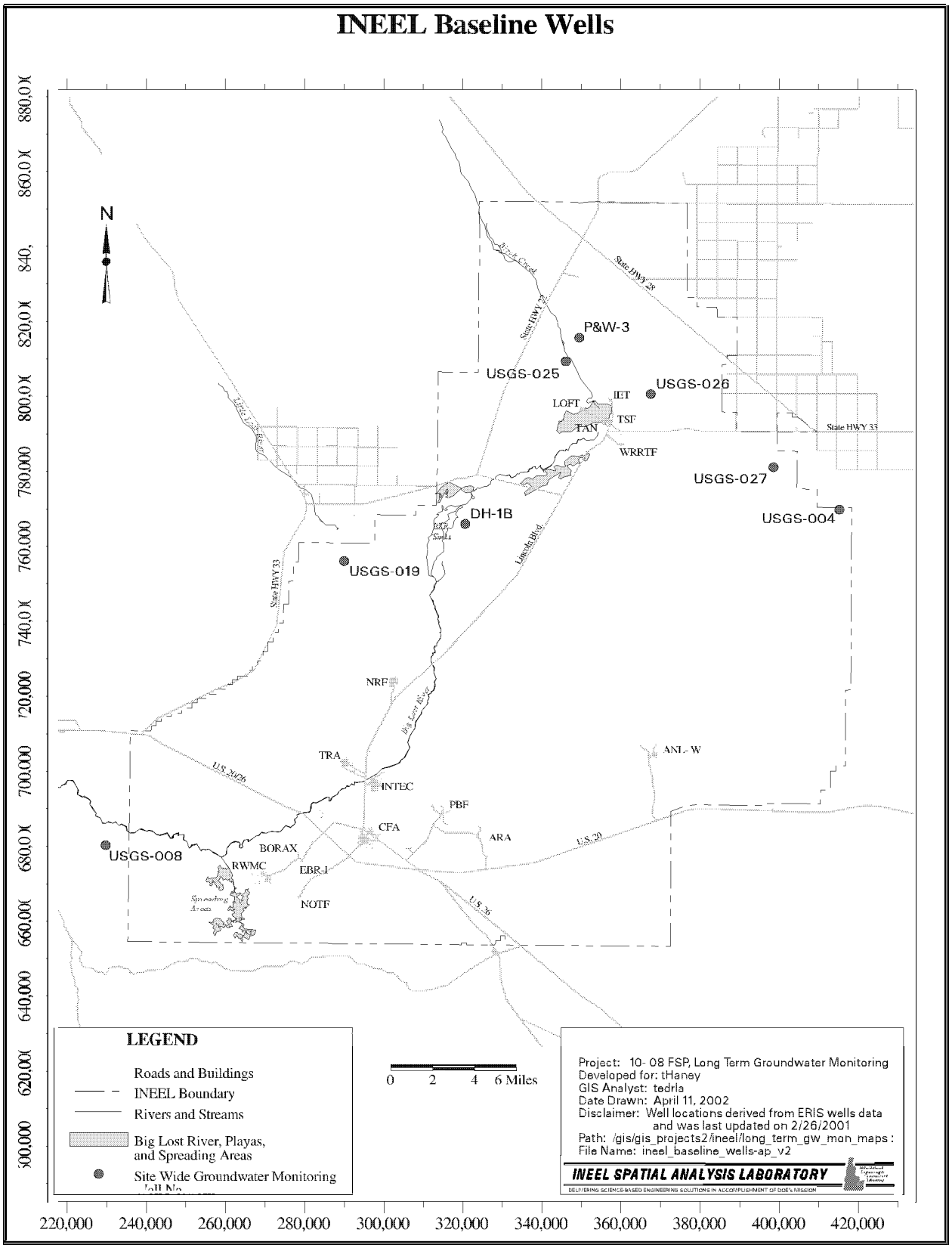

Figure A-1. INEEL baseline wells.

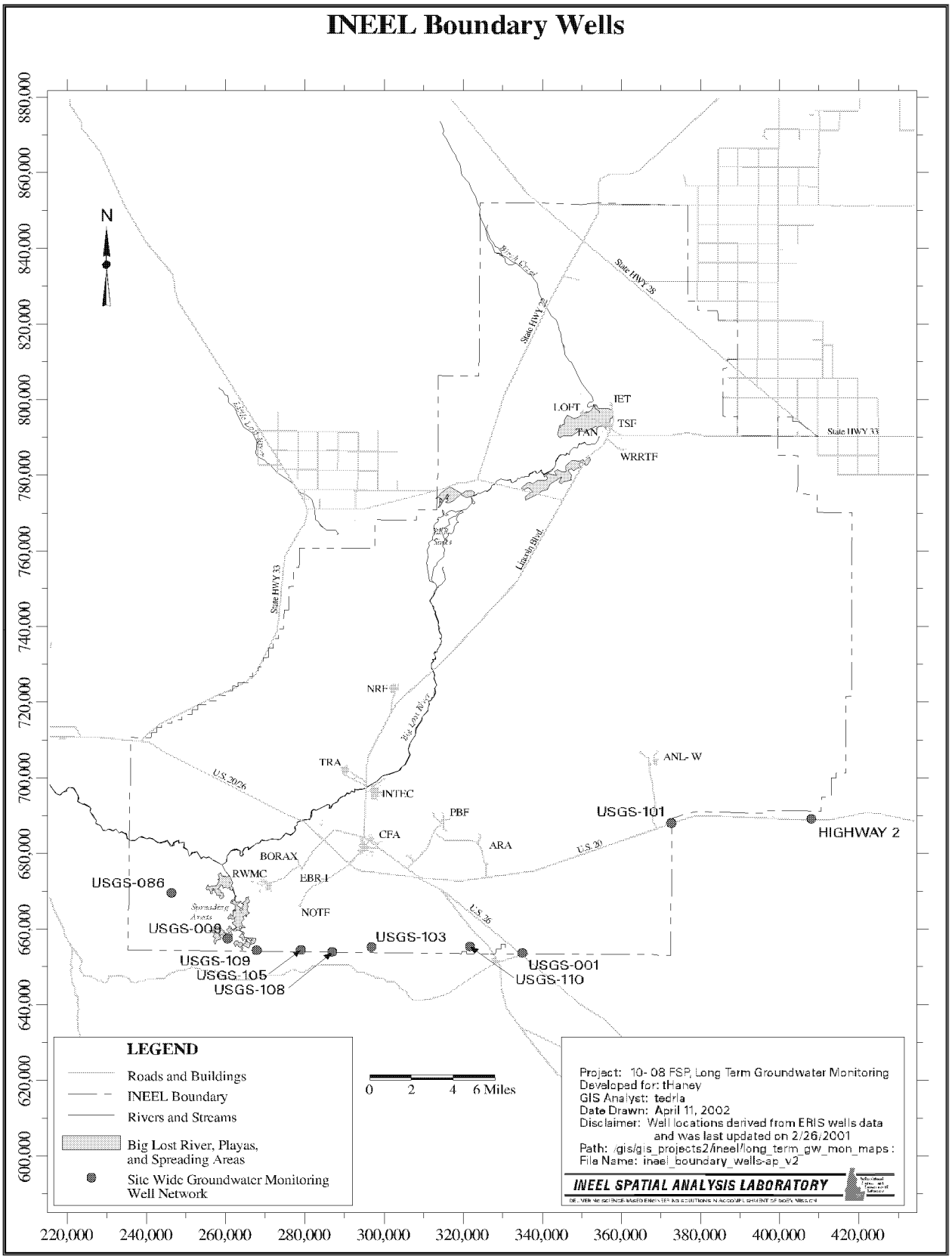

Figure A-2. INEEL boundary wells.

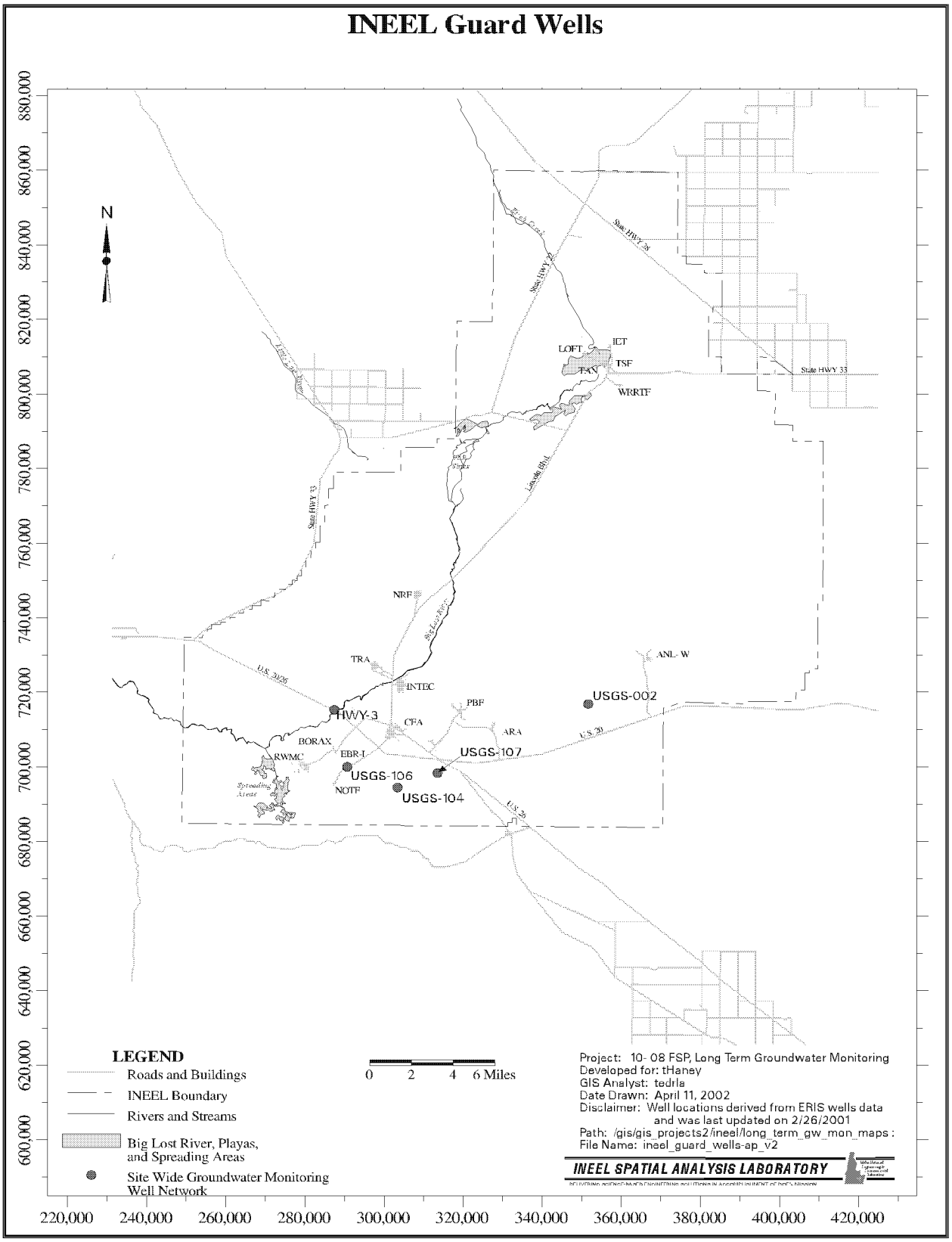

Figure A-3. INEEL guard wells.

Appendix B

Sampling and Analysis Plan Tables

Plan Table Number: OU10-08_GW_FY03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 07/08/2002 Plan Table Revision: 0.0 Project: OU10-08 GROUND WATER Project Manager: HIARING, C. M. SMO Contact: ELDER, T. E.

Sample Description					Sample Location				Enter Analysis Types (AT) and Quantity Requested																			
									AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Planned Date	Area	Type of Location	Location	Depth (ft)	C6	Q6	N7	5X	RH	EA	LF	AV	AZ											
GWM020	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-001	588	1	1	1		1	1	1	1												
GWM021	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-009	607	1	1	1		1	1	1	1												
GWM022	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-086	649	1	1	1		1	1	1	1												
GWM023	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-101	771	1	1	1		1	1	1	1												
GWM024	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-103	583	1	1	1		1	1	1	1												
GWM025	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-105	670	1	1	1		1	1	1	1												
GWM026	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-108	609	1	1	1		1	1	1	1												
GWM027	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-109	621	1	1		1	1	1	1	1												
GWM028	REG	GROUND WATER	GRAB	11/11/02	INEELBOUNDARY	AQUIFER WELLS	USGS-110	566	1	1	1		1	1	1		1											
GWM029	REG/QC	GROUND WATER	DUP	11/11/02	INEELBOUNDARY	AQUIFER WELLS	HIGHWAY 2	725	2	2	2		2	2	2	2												
GWM030	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	USGS-002	659	1	1	1		1	1	1	1												
GWM031	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	USGS-104	555	1	1	1		1	1	1	1												
GWM032	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	MP2	TBD	1	1	1		1	1	1	1												
GWM033	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	MP2	TBD	1	1	1		1	1	1	1												
GWM034	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	MP2	TBD	1	1	1		1	1	1	1												

The sampling activity displayed on this table represents the first six characters of the sample identification number.

The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: C-14, I-129, Tritium

AT2: Nitrate (as Nitrogen)

AT3: Nitroaromatics (8330)

AT4: Nitroaromatics (8330) MS/MSD

AT5: Radiochemistry - Suite 1

AT6: Tc-99

AT7: Total Metals (CLP TAL) - Filtered

AT8: VOCs (Appendix IX TAL)

AT9: VOCs (Appendix IX TAL) - MS/MSD

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

Nitroaromatics (8330) = RDX, TNT

Total metal contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc

Analysis Suites:

Radiochemistry - Suite 1: Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies:

Plan Table Number: OU10-08_GW_FY03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 07/08/2002 Plan Table Revision: 0.0 Project: OU10-08 GROUND WATER Project Manager: HIARING, C. M. SMO Contact: ELDER, T. E.

Sample Description					Sample Location				Enter Analysis Types (AT) and Quantity Requested																
									AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Planned Date	Area	Type of Location	Location	Depth (ft)	C6	Q6	N7	5X	RH	EA	LF	AV	AZ											
GWM035	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	USGS-106	584	1	1	1		1	1	1	1												
GWM036	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	USGS-107	477	1	1	1		1	1	1	1												
GWM037	REG	GROUND WATER	GRAB	11/11/02	GUARD WELLS	AQUIFER WELLS	HIGHWAY 3	538	1	1	1		1	1	1	1												
GWM038	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-004	251	1	1	1		1	1	1	1												
GWM039	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-008	766	1	1	1		1	1	1	1												
GWM040	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-019	276	1	1	1		1	1	1		1											
GWM041	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-025	272	1	1		1	1	1	1	1												
GWM042	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-026	212	1	1	1		1	1	1	1												
GWM043	REG/QC	GROUND WATER	DUP	11/11/02	BASELINE WELLS	AQUIFER WELLS	USGS-027	228	2	2	2		2	2	2	2												
GWM044	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	DH-1B	268	1	1	1		1	1	1	1												
GWM045	REG	GROUND WATER	GRAB	11/11/02	BASELINE WELLS	AQUIFER WELLS	P&W-3	304	1	1	1		1	1	1	1												
GWM046	QC	WATER	FBLK	11/11/02	INEEL	FIELD BLANK	QC	NA	1	1	1		1	1	1	1												
GWM047	QC	WATER	FBLK	11/11/02	INEEL	FIELD BLANK	QC	NA	1	1	1		1	1	1	1												
GWM048	QC	WATER	FBLK	11/11/02	INEEL	FIELD BLANK	QC	NA	1	1	1		1	1	1	1												
GWM049	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												

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The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT1: C-14, I-129, Tritium

AT2: Nitrate (as Nitrogen)

AT3: Nitroaromatics (8330)

AT4: Nitroaromatics (8330) MS/MSD

AT5: Radiochemistry - Suite 1

AT6: Tc-99

AT7: Total Metals (CLP TAL) - Filtered

AT8: VOCs (Appendix IX TAL)

AT9: VOCs (Appendix IX TAL) - MS/MSD

AT10:

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

Nitroaromatics (8330) = RDX, TNT

Total metal contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc

Analysis Suites:

Radiochemistry - Suite 1: Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies:

Sampling and Analysis Plan Table for Chemical and Radiological Analysis

Plan Table Number: OU10-08_GW_FY03

SAP Number: INEEL/EXT-01-01529 REV 2.

Date: 07/08/2002 Plan Table Revision: 0.0 Project: OU10-08 GROUND WATER Project Manager: HIARING, C. M. SMO Contact: ELDER, T. E.

Sample Description					Sample Location				Enter Analysis Types (AT) and Quantity Requested																
									AT1	AT2	AT3	AT4	AT5	AT6	AT7	AT8	AT9	AT10	AT11	AT12	AT13	AT14	AT15	AT16	AT17	AT18	AT19	AT20
Sampling Activity	Sample Type	Sample Matrix	Coll Type	Planned Date	Area	Type of Location	Location	Depth (ft)	C6	Q6	N7	5X	RH	EA	LF	AV	AZ											
GWM050	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM051	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM052	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM053	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM054	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM055	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM056	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM057	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM058	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												
GWM059	QC	WATER	TBLK	11/11/02	INEEL	TRIP BLANK	QC	NA								1												

The sampling activity displayed on this table represents the first six characters of the sample identification number.

AT1: C-14, I-129, Tritium

AT2: Nitrate (as Nitrogen)

AT3: Nitroaromatics (8330)

AT4: Nitroaromatics (8330) MS/MSD

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AT6: Tc-99

AT7: Total Metals (CLP TAL) - Filtered

AT8: VOCs (Appendix IX TAL)

AT9: VOCs (Appendix IX TAL) - MS/MSD

AT10:

The complete sample identification number (10 characters) will appear on field guidance forms and sample labels.

AT11:

AT12:

AT13:

AT14:

AT15:

AT16:

AT17:

AT18:

AT19:

AT20:

Comments:

Nitroaromatics (8330) = RDX, TNT

Total metal contaminants of potential concern (COPCs) are: arsenic, beryllium, cadmium, chromium, lead, mercury, and zinc

Analysis Suites:

Radiochemistry - Suite 1: Gross Alpha, Gross Beta, Gamma Spec, U-Iso, Sr-90

Contingencies: